

BOOK REVIEWS

DICTIONARY OF CULTIVATED PLANTS AND THEIR REGIONS OF DIVERSITY: EXCLUDING MOST ORNAMENTALS, FOREST TREES AND LOWER PLANTS, by A. C. Zeven and J. M. J. de Wet, with pp. 263 and 110 maps. 2nd rev. ed. Wageningen: Centre for Agricultural Publishing and Documentation (Pudoc), 1982. Hard cover Dfl. 90,00 (R47 plus tax).

Reviewers of books featured in this *Journal* are asked to be constructive. In the present instance this is very difficult for as far as I can see its only commendable feature is overall appearance: size, pagination and format are in accordance with the best traditions of Pudoc. The binding seems tough and durable and is a great improvement on that of the original edition. There are a number of printing errors—*Sanseverinia* for *Sansevieria* and *Euphrobiaceae* for *Euphorbiaceae* are examples—and these are probably the result of slap-dash proofreading. But as far as the contents are concerned, for the life of me I cannot understand how this book achieved a second printing! I can only assume either that purchasers are extraordinarily ignorant of current concepts in taxonomy and phytogeography or that there is a chronic dearth of reference works in this field. And to add insult to injury, it has doubled in price.

The first edition was reviewed by the writer in 1976 [*Jl S. Afr. Bot.* 42 (2)] in which he described the general layout of contents. The work has now been enlarged to include about 2 300 species; unfortunately it has also incorporated a greater number of errors despite the comment of the senior author that mistakes and omissions have been rectified. The co-operation of a new co-author (Professor P. M. Zhukovskiy died in 1975) does not seem to have benefited the present edition.

In the Preface it is stated that taxonomy is based primarily on Willis's dictionary (1966) and the Bailey Hortorium, *Hortus Third* (1976). Chromosome numbers are derived from Bolkhovskisch *et al.* (1969). Airy-Shaw revised Willis in 1973 and a far better conspectus of chromosome numbers was published under the auspices of the Missouri Botanical Garden in 1981. This explains the appallingly out-dated nomenclature and a plethora of inaccurate author citations; I counted 42 in the African Region section alone.

The drawings are hardly designed to aid taxonomy, for those on pages 99, 100, 111, 134, 136, 173 would not pass muster in a Botany I practical class; that of *Sorghum bicolor* looks like the sweeping-broom a certain Dutch admiral used to hoist to his mast-head. *Malus prunifolia* has its origin in Northern China and East Asia and yet is included in the Near Eastern Region. *Prunus bessyi* belongs to North America but its drawing is firmly set down in the Chinese-Japanese Region. This is very misleading. Many species are asterisked but it is left to the imagination to resolve the meaning of this symbolism. In fact it indicates that there is a related reference elsewhere in the book.

The aim of this work is to give the reader quick reference to the regions of diversity of cultivated plants and related wild species. If so, why is peach listed as having a secondary centre of distribution in California and not in Georgia? Why has lucerne not been included in the U.S.A.? A number of plants now widely cultivated in southern Africa are not included whereas some of dubious value receive "star" billing. As-

palathus linearis and *Cyclopia genestoides* are not mentioned and the taxonomy of the buchus is hopelessly inaccurate.

Distribution maps do not inspire confidence and the snippets of data given in the text are inadequate. *Dioscorea hirtiflora* for example, occurs in dense forests as well as "Savanna" and *Oxytenanthera abyssinica* extends to the limits of the tropical zone. The maps depicting Central American and Mexican Region and North American Region exclude the West Coast of the U.S.A. completely. Presumably the authors are waiting for a cataclysmic shift of the San Andreas Fault to raft California out to sea, whereupon it can be treated as an island ecosystem!

I apologise to Pudoc but not to the authors for this scathing review. They ought really to have done their homework more thoroughly.

O. KERFOOT

THE STUDY OF PLANT STRUCTURE: PRINCIPLES AND SELECTED METHODS, by T. P. O'Brien and M. E. McCully, with pp. x + 248. Melbourne: Termarcaphi Pty Ltd, 1981. Distributed outside Australia by Blackwell Scientific Publications, approx. US \$32.00. ISBN 0 9594 174 0 0.

Books on plant microtechnique do not appear frequently. All anatomists and morphologists—in fact all botanists seriously interested in plant structure—are familiar with Johansen's classic *Plant Microtechnique* (1940) and Sass' *Botanical Microtechnique* (3rd edition, 1958). These two books were followed by Jensen's *Botanical Histochemistry* (1962), a pioneer in its field but now crying out for revision and updating (an immense task!), as well as *Botanical Microtechnique and Cytochemistry* by Berlyn and Miksche (1976), purportedly the successor to the Sass book, but somewhat heavy and disappointing.

One of the outstanding botanical papers of 1968 was that by N. Feder and T. P. O'Brien which appeared in the *American Journal of Botany* (55: 123–142) under the title "Plant microtechnique: some principles and new methods". This paper introduced the revolution which subsequently occurred in plant microtechnique by providing convincing evidence that there were available methods far superior to the classic coagulative fixative–paraffin wax embedding techniques.

Now O'Brien (Monash University, Australia) and Margaret McCully (Carleton University, Canada) have, in the book under review, produced a worthy successor to Johansen's, Sass' and Jensen's books. *The Study of Plant Structure* will be welcomed by the microtome for, in addition to many novel methods, there are a host of practical tips and an excellent list of references.

The book is organised into six chapters. The first is a short presentation of physical principles as they apply mainly to the perception of structure, while the second considers methods of microscopy and includes valuable information on fluorescence, a hitherto much neglected aspect of botanical microscopical procedure. Chapters 3 and 4, respectively, deal with morphological and anatomical methods. Chapter 5 is on photomicrography. Finally, Chapter 6, the practical heart of the book, encompasses what the authors refer to as *Formulary*. As the term implies, this is a glossary of protocols involving everything from replicas, whole mounts and macerates to fixatives, embedding, sectioning and staining. The book is concluded with 11 appendices and a long list of references, but—most unfortunately—with no index. This omission, together with a weak binding, is the book's most serious defect.

The authors might have argued that the more than five pages of contents negates the preparation of an index, but finding one's way around can be quite frustrating. It is not made any easier by the bureaucratic blur of digits. Example: Negative staining is listed as 6.15.13.6 under 6.15.13—Staining Methods for Electron Microscopy, and found on p. 6.102. There are also other—but minor—irritations such as a large number of typographical errors (example: James and Jape instead of James and Jope) and the mentioning of obviously interesting and specific methods (example: fluorescent staining of DNA by 4'6-diamidino-2-phenylindole) without giving the full procedures.

The authors have produced a mine of well-documented and pertinent information, ranging from careful, stepwise procedures such as, for example, the re-purification of glutaraldehyde to valuable hints on the physical manipulation of materials, techniques and instruments. Their explanations of the principles of microscopy, fixation and staining are uncomplicated and lucid. The history and development of plant microtechnique is also adequately covered by their extensive coverage of the relevant literature.

If ever so slight an impression might be gained that O'Brien and McCully are actually writing for O'Brien and McCully, it should be seen against the background of the vast collective microtechnical experience of both of these pioneering – and, it should be added, excellent—investigators. *The Study of Plant Structure* is a highly recommendable compendium.

CHRIS H. BORNMAN

MOLECULAR BIOLOGY OF PLANT TUMOURS, edited by G. Kahl and J. S. Schell, with pp. xxiv + 615. New York, London, Paris, San Diego, San Francisco, São Paulo, Sydney, Tokyo, London: Academic Press, 1982. US\$69,50. ISBN 0 12 394380 9.

With the flush of current interest and activity in plant molecular genetical engineering, a book on plant tumours was bound to be among those that have started to appear. Some plant tumours, namely, are associated with two species of *Agrobacterium*: *tumefaciens* and *rhizogenes*. These bacteria, the respective causative agents of stem tumours and hairy root disease, contain corresponding tumour-inducing (Ti) and hairy root-inducing (Ri) plasmids. These plasmids are regarded as potentially the most important vectors for the eventual transformation of plants via the transfer of foreign DNA into that of the host plant's genome.

The book under review is an impressive volume, comprising 24 chapters contributed to by no less than 51 authors. It is divided into three parts: (1) abnormal plant growth, (2) crown gall tumours, and (3) potential vectors for genetic engineering in agriculture. In Part 1 there are two especially highly informative contributions, one on habituation or anergisation and the other on the physiological aspects of genetic tumour formation in interspecies hybrids. There is also a contribution on insect galls with major emphasis on galls of the Cecidomyiidae. In Part 2 the doyen of the crown gall, Armin Braun, gives a historical account of the problem. There follow contributions by persons who have been and are very actively engaged in Ti plasmid research: Van Montagu, Schell, Chilton, Schilperoort, Tempé, and others. Finally, in Part 3, other potential vectors such as cauliflower mosaic virus and plasmids of *Rhizobium* are also considered.

This book is timely, coming as it does at a period when "molecular plant genetic engineering" has become a catch phrase, but yet underscoring the point that man is able to learn his lessons from Nature. As Schell likes to point out, Nature, in the form of *Agrobacterium tumefaciens*, has set a perfect example of how genes are engineered, and moved, from micro- to macro-organism. Applying these lessons, a number of laboratories (such as Ghent, Versailles, Leiden, Cetus-Berkeley) have shown that the integration of foreign DNA into the plant cell genome is not only possible, but that its transmittance through meiosis to subsequent plant generations is feasible.

Although comprised of many chapters by more than twice that many authors, the book is well edited and supplied with an extensive index. The papers on the whole are eminently readable and well-illustrated, and should serve as valuable sources of reference. It is not only the molecular biologist who will benefit by this book, but tissue culturalists generally, regardless of whether their primary interest is genetics, biochemistry or plant physiology.

CHRIS H. BORNMAN

PHYSIOLOGICAL PLANT ECOLOGY: II. WATER RELATIONS AND CARBON ASSIMILATION, edited by O. L. Lange, P. S. Nobel, C. B. Osmond and H. Ziegler, with pp. xi + 747 and 153 figures. New York, Heidelberg, Berlin: Springer-Verlag, 1982. Volume 12 Part B in the New Series "Encyclopedia of Plant Ecology". DM 288, approx. US\$120,10. ISBN 3 540 10906 4.

This is the second in the four-part series on physiological plant ecology. It is a large book (747 pages) made up of 18 chapters plus an Introduction, an author index, a taxonomic index and a subject index (which is comprehensive and very useful).

The title gives equal emphasis to water relations and carbon assimilation, and although the two are inextricably linked in an ecological sense (as emphasised by the authors in their Introduction), there is in fact far more weight given to water relations. Fourteen of the chapters are concerned primarily or exclusively with water, and only four with carbon assimilation.

The book begins with a useful overview of water in the soil-plant-atmosphere continuum. The next four chapters deal with water status, uptake, movement and storage in plants, followed by two chapters on water loss (via plant surfaces and via stomata). All of these chapters are detailed, up-to-date and of a high standard. There is then a chapter which reviews the various mathematical models of water loss. The chapter itself is descriptive with virtually no mathematics of its own.

The following three chapters provide a thorough, physiological and physical account of plant water stress. They provide a most useful and interesting account of this subject.

Following two chapters on germination (of seeds and spores) and one on flooding, the final four chapters deal with photosynthesis and carbon-water relations. The chapter by Osmond, Winter and Ziegler on the functional significance of different pathways of CO₂ fixation in photosynthesis is of particular note. The first half of the chapter is a well-presented review of the fundamental biochemical basis of the three photosynthetic CO₂ fixation pathways. It is followed by sections on the physiological context and the ecological context, and the chapter is recommended reading for all who are interested in the physiological basis of plant ecology. The final chapter, by E.-D. Schulze, on plant life forms and their carbon, water and nutrient relations, is

also a very useful review of the physiological basis for different forms and growth habits of plants.

Technically the book is well produced. There are virtually no typographical errors. Figures and tables are clear and the cross-referencing and common style suggest careful editing. Considering today's book prices, the cost is not outrageous (a mere \$120), but it is a pity that it will be beyond the means of most individuals, since the book deserves to be in the personal library of all plant ecologists. It is a must for all libraries concerned with botany, ecology and agriculture.

B. H. WALKER

ADVANCES IN RESEARCH AND TECHNOLOGY OF SEEDS: PART 6, edited by J. R. Thomson, with pp. 124. Wageningen: Centre for Agricultural Publishing and Documentation (Pudoc), 1981. Dfl. 36,00. ISBN 90-220-0786-3.

This is again a worthwhile contribution in which recent advances in four pertinent topics in the field of the physiology of seed development and germination are reviewed. The following topics are covered: Ecological aspects of seed germination (P. A. Thompson); Physiological and biochemical events in seed development (Daphne J. Osborne); Changes in seed composition during germination (J. C. Slaughter); and Germination of seeds (A. Lovato).

Although all four reviews are valuable in assisting the seed scientist to keep informed of new developments, the review by Thompson is an approach from a different angle and particularly interesting subjects such as maintenance of plant population, germination strategies and environment and phenotypic plasticity of germination responses in relation to geographical distribution are discussed.

Advances in Research and Technology of Seeds is primarily intended for seed research workers and seed technologists. Apart from the seed specialist, however, this volume would also be of special interest to plant ecologists in South Africa.

Plant names and subject matter are well indexed.

J. G. C. SMALL

ADVANCES IN RESEARCH AND TECHNOLOGY OF SEEDS: PART 7, edited by J. R. Thomson, with pp. 140. Wageningen: Centre for Agricultural Publishing and Documentation (Pudoc), 1982. Dfl. 36,00. ISBN 90-220-0802-9.

This volume contains four reviews primarily covering papers published after 1977.

Weed seed investigations by R. J. Chancellor reviews dormancy, periodicity of germination, seeds in the soil, survival of buried seed and seedling emergence. The possibilities and need for further investigations on the use of chemicals for breaking weed seed dormancy as an effective control measure are clearly shown.

Effects of radiation on seeds is aptly reviewed by A. D. McKelvie. In addition to ionising radiation effects, in which field most papers were published, the review mentions a few papers on microwaves, ultrasound and magnetic fields.

The shift in research emphasis from mutation induction to stimulation of growth and yield by radiation is interesting.

The review by D. L. Smith on seed development and structure emphasises morphology. This is welcomed in a science dominated by physiology and biochemistry. Seed identification remains a problem for seed analysts and it is of interest to note the possible use of the computer as a tool in seed identification.

Research on environmental and genetic factors affecting tree and shrub seeds is reviewed by B. S. P. Wang, J. S. Pitel and D. P. Webb.

Although papers on dormancy dominate this review, other interesting topics such as effect of pesticides and seed mass on germination, seed dispersion and seed losses due to insects, rodents and disease, are covered.

This volume, with a good subject index, should appeal to a wide range of plant research scientists including geneticists, foresters and ecologists.

J. G. C. SMALL

ANNOUNCEMENT

It is a great pleasure to announce the founding of the International Association for Landscape Ecology. The objectives of this organisation are to enhance communication among scientists, planners and managers in landscape ecology, and to promote the development of knowledge in this field and its dissemination and application.

The landscape concept deals with areas on a scale which may contain many relatively homogeneous ecosystems, or landscape elements, which invariably differ in the degree of human activity or impact associated with them. Landscape ecology, therefore, studies the structure, function and development of landscapes. Structure in this context may refer to the spatial dimension and distribution of landscape elements; function to the flow of energy, mineral nutrients and species among these elements, and development to the change in the landscape as a whole through time.

An interest in the development of concepts in this field, or the application of such concepts, forms the kernel of the International Association, whose members include, *inter alia*, ecologists, geographers, planners, landscape architects, foresters, wildlife biologists, land managers, urban and regional designers and environmental scientists. Landscape ecology is, of course, a formal discipline in a number of European countries.

Anyone who has an interest in landscape ecology is invited to send their name and address to:—

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You will receive the first issue of the IALE Bulletin and other announcements once you are on the mailing list.